Cosgrove Ring Annuloplasty For Functional Tricuspid Regurgitation

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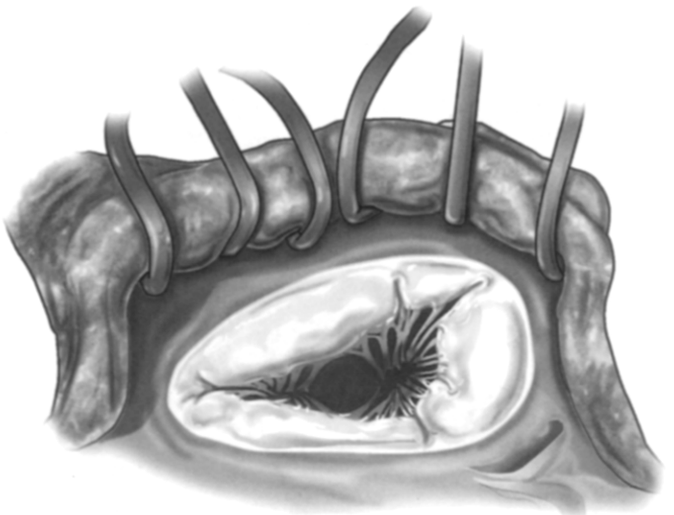
Although tricuspid valve regurgitation can be caused by organic disease, most tricuspid regurgitation encountered in clinical practice is functional, occurring in patients with chronic left-sided valvular lesions. Ten percent to 50% of patients with severe mitral dysfunction have important tricuspid regurgitation.[1,2] In such cases, the tricuspid valve leaks during systole despite structurally normal leaflets and chordae.[3] Functional tricuspid regurgitation is attributable to the interaction of multiple factors, including annular and right ventricular dilation, pulmonary hypertension, and depressed annular shortening during systole.[3-5]

Recently, surgeons have taken a more aggressive approach to the treatment of tricuspid regurgitation in patients with left-sided valvular lesions.[3] When operating for mitral or aortic valve disease, the surgeon should not ignore tricuspid regurgitation that is 3+ or 4+. Because tricuspid regurgitation is dynamic and is frequently down-graded by intraoperative echocardiography, the decision to address the tricuspid valve should be based on preoperative studies. Management of 2+ tricuspid regurgitation is controversial.

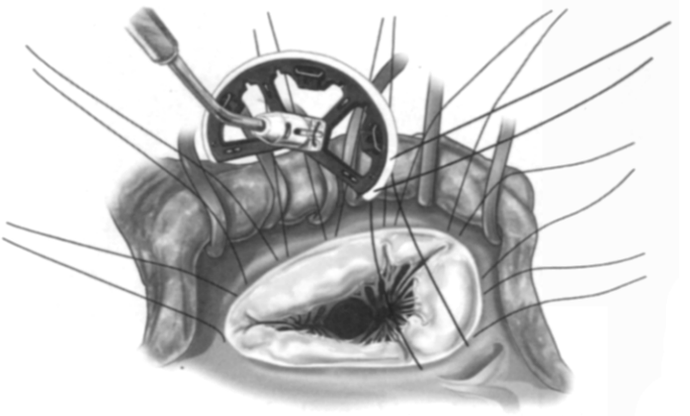
Several surgical options have been employed in the treatment of functional tricuspid regurgitation. These include tricuspid valve replacement, bicuspidalization annuloplasty, suture annuloplasty, and partial or complete ring annuloplasty. There is general agreement that some sort of formal ring or band provides the best results, particularly in patients with pulmonary hypertension.[6-8]

For correction of functional tricuspid regurgitation, we favor placement of a universally flexible band that reduces annular diameter adjacent to the anterior and posterior leaflets. Because five sixths of annular dilation takes place at the base of the anterior and posterior leaflets, positioning the band in this region directly addresses one of the most important derangements in patients with functional tricuspid regurgitation.[6,9] To ensure leaflet coaptation, a 26- or 28-mm annuloplasty device is used.

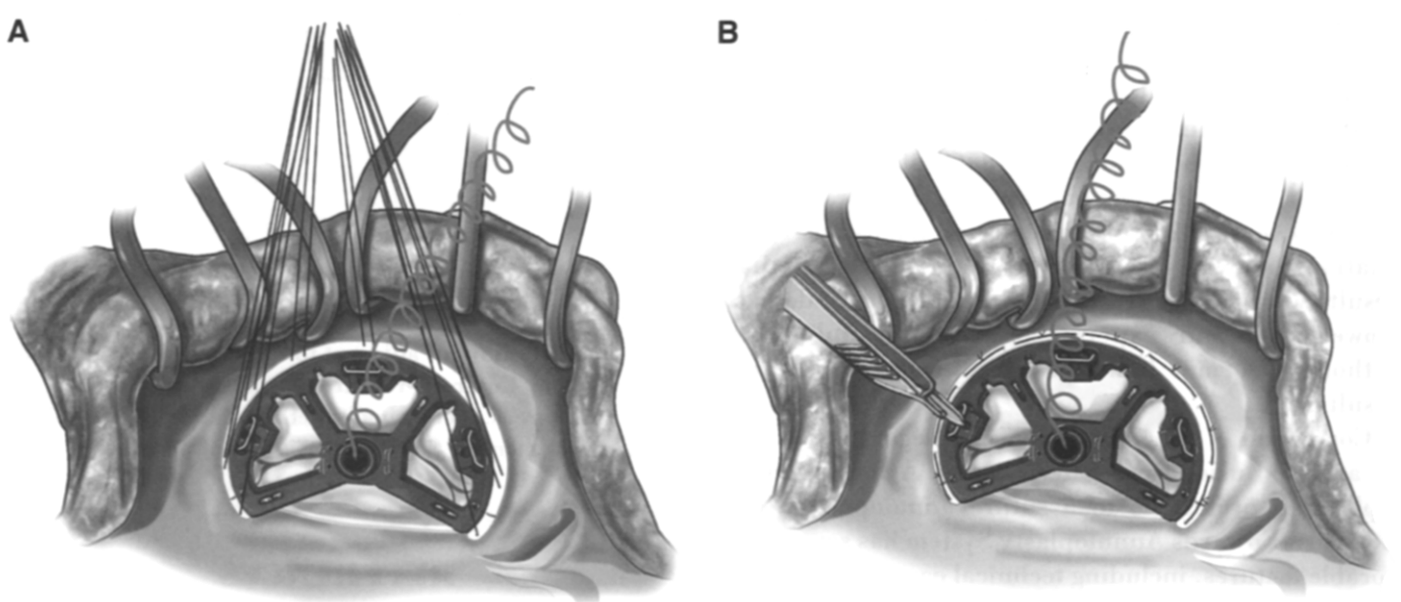
SURGICAL TECHNIQUE



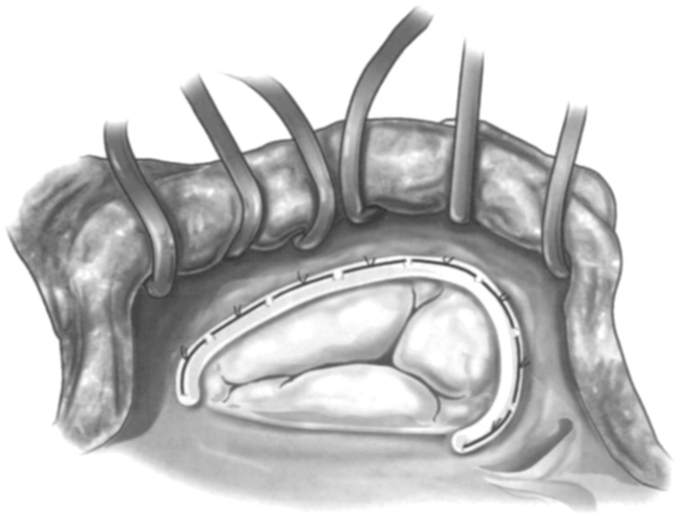
1 Exposure of the tricuspid valve. In isolated valvular surgery, the heart is exposed via partial upper sternotomy. In reoperative cases or in patients that require coronary artery bypass grafting, a standard median sternotomy is used. The tricuspid valve is exposed through a right atriotomy. In functional tricuspid regurgitation, the valve leaflets appear normal and the annulus is dilated.



2 Placement of annuloplasty sutures. Interrupted mattress sutures of 2 to 0 nonabsorbable multifilament material are placed in the tricuspid annulus, beginning at the posterolateral commissure and extending around the annulus to the anteroseptal commissure. Six to ten sutures are generally required. The sutures are then passed through a 26- or 28-mm annuloplasty band.



3 Placement of the annuloplasty band. (A) The annuloplasty band is slid into position and the handle is removed from the frame. The sutures are tied sequentially, producing a measured plication of the annulus in the region of greatest dilation. During tying, the handle remains connected to the frame by a lanyard. (B) When all the sutures have been tied, the three sutures on the frame are cut, and the frame is removed from the annuloplasty band by gently pulling the lanyard.

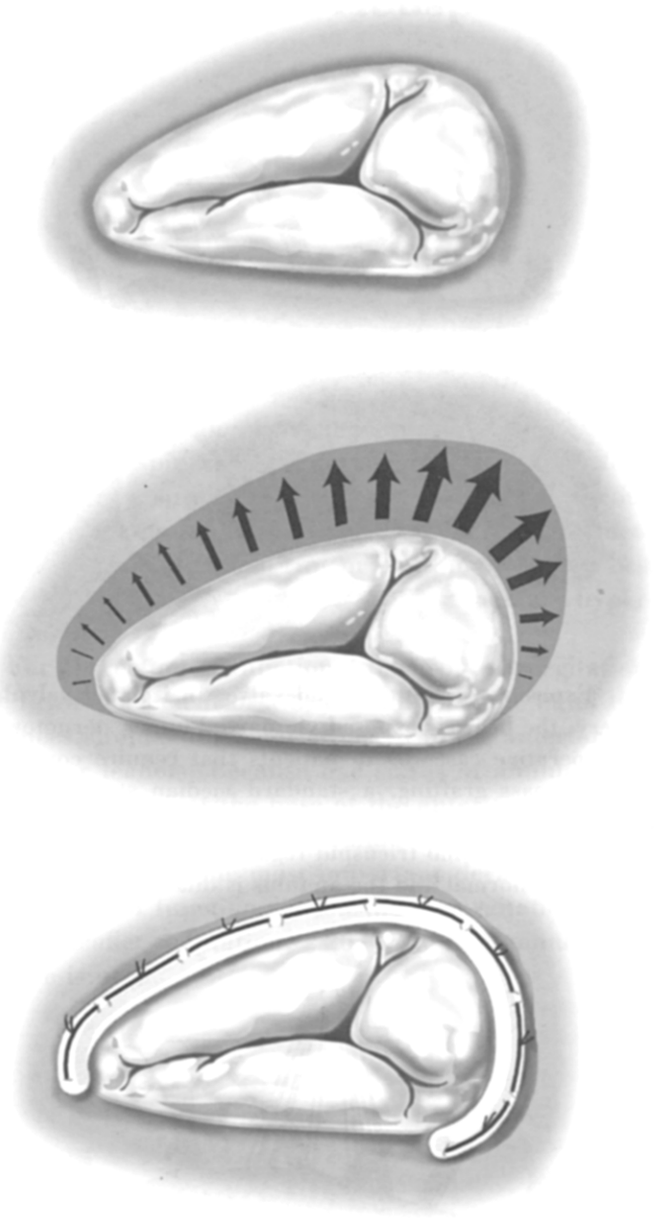


4 Completed tricuspid annuloplasty. The annuloplasty band is in position. A measured plication of the annulus adjacent to the anterior and posterior leaflets is achieved, and the conduction system is not jeopardized.

COMMENTS

Since its introduction in 1995, the Cosgrove-Edwards Annuloplasty System has been our primary technique for correction of functional tricuspid regurgitation. From 1990-1999, 291 patients received this treatment for functional tricuspid regurgitation. At predischarge echocardiogram, 85% of patients had tricuspid regurgitation that was less than or equal to 2+. At 5 years, 82% of patients had tricuspid regurgitation that was less than or equal to 2+. Similar results were noted with a rigid annuloplasty device. However, in our experience, suture annuloplasty without a formal band or ring produced inferior results.

Correction of functional tricuspid regurgitation can be achieved using several techniques. A formal annuloplasty is preferable to a suture annuloplasty. The Cosgrove-Edwards Annuloplasty System has several favorable features, including technical ease, avoidance of suturing near the conduction system, and measured plication of the areas of greatest annular dilation. Postoperative studies demonstrate that a flexible annuloplasty preserves the physiologic shape and normal sphincter mechanism of the valve.[10] Both early and long-term results with this system have been gratifying, and the flexibility of the annuloplasty system may have long-term advantages in the preservation of tricuspid valve function.



5 Correction of functional tricuspid regurgitation. In functional tricuspid regurgitation, most annular dilation occurs along the annulus adjacent to the anterior and posterior leaflets. The Cosgrove-Edwards Annuloplasty System plicates these areas, increasing leaflet coaptation while avoiding suture placement in the region of the septal leaflet.

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1522-2942/03/0804-0005$30.00/0
doi:10.1053/S1522-9042(03)00043-8